



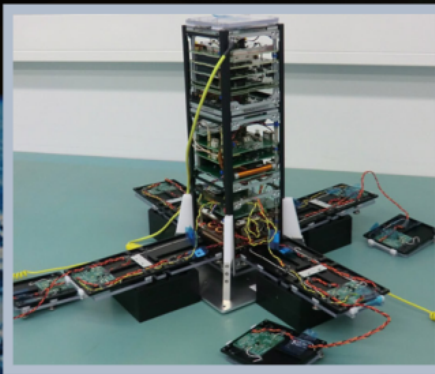
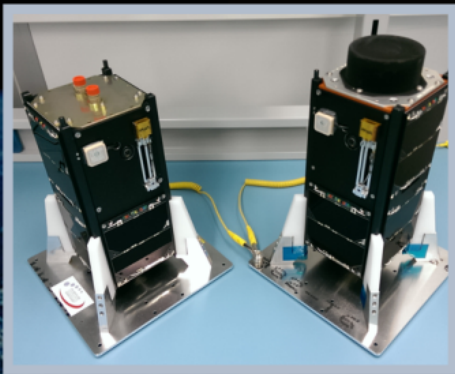
Stay on the Path

**Sticking to your Selected CubeSat Mission
to Achieve Project Success**



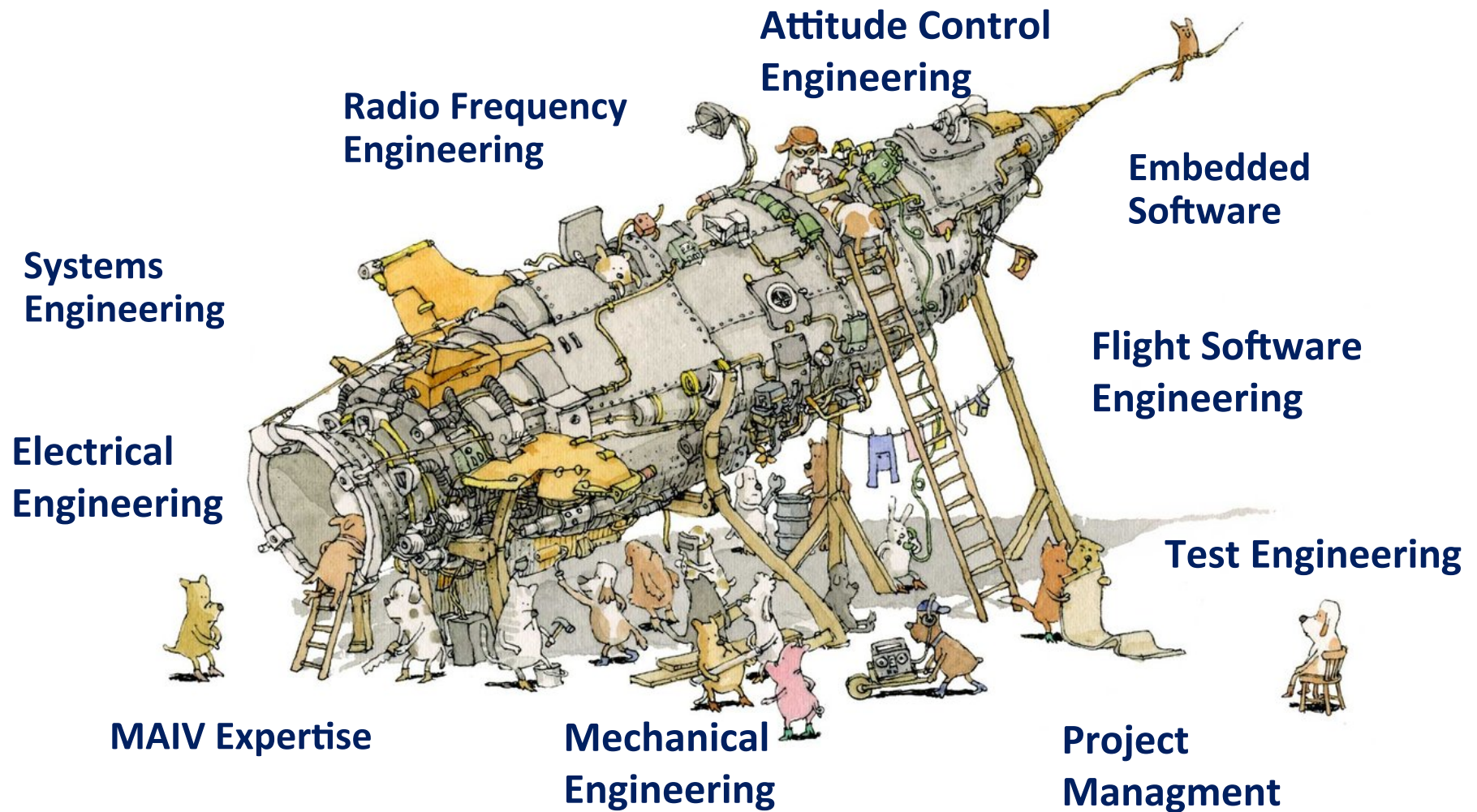
Innovative Solutions In Space

- Small satellite solutions (1 - 25 kg)
- Vertically integrated space company
 - Research and development
 - Components and subsystem production
 - Satellite mission design and implementation
 - Satellite launch services
 - Satellite operations
- 50 FTE based in Delft, The Netherlands





Fully integrated CubeSat Capability





Main Activities

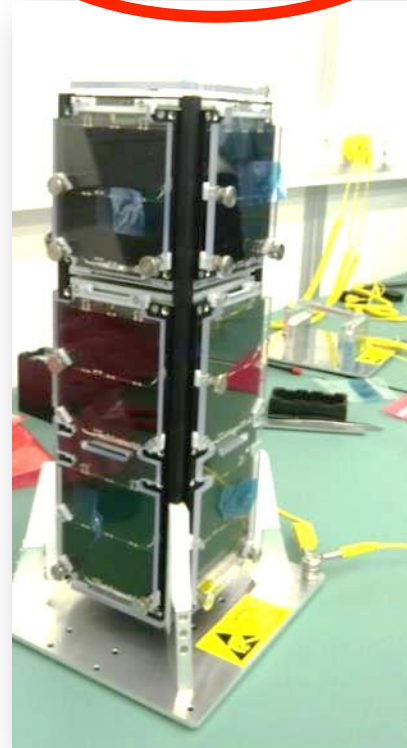
Standard Products



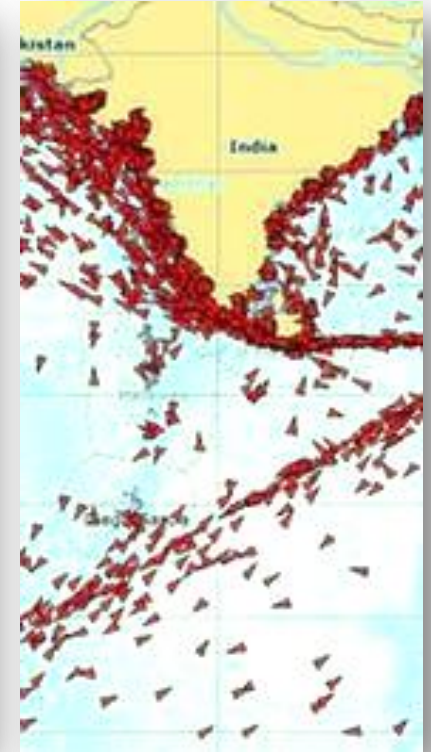
Launch Services

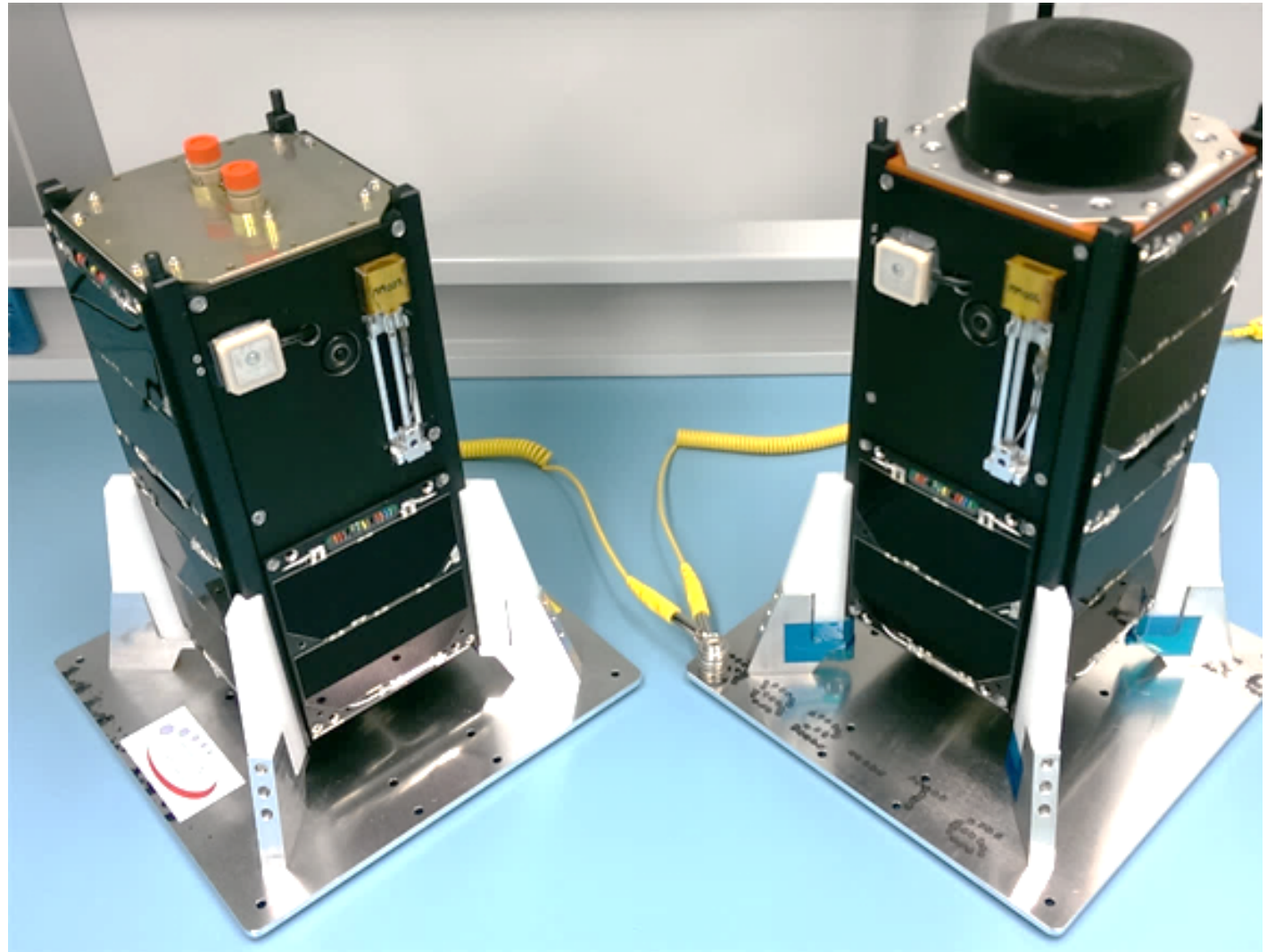
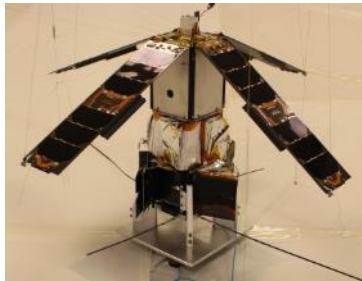
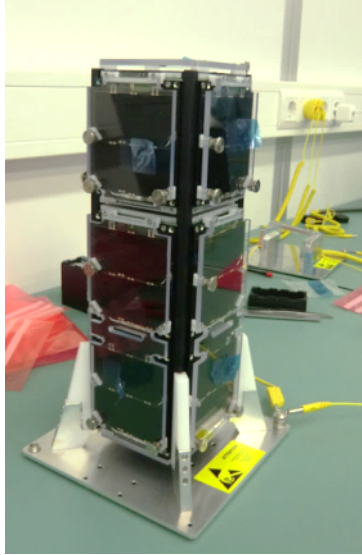


Missions & systems



Networks & Applications





CubeSat platforms and turnkey solutions



Evolving CubeSat Market

Changing Applications

- Education
- Tech Demonstration
- Small Scale Science
- Pre-operational Demonstrators
- Medium Scale science (e.g. Radio Astronomy)
- Near-RealTime Global Monitoring
 - Remote Sensing
 - Tracking and Tracing
 - (Space) Weather
- Telecom (M2M, data backhaul)
- ISIS works on missions projects over the full application range

Changing User / Customer Base

- Academia
- Research Groups and SME's
- Space Agencies and LSI's
- Startup companies, and Commercial Ventures based on data services
- ISIS supports the full range of CubeSat customers



Change in design approach

- From a low cost educational tool...
(anything goes)
- ...to a constraint-based, cost-effective LEO demonstrator...
(live with its limitations)
- ...to a niche market, full-fledged space solution
(more classical design approach)

... Large risk of mixing or switching design approaches creating programmatic issues

Efficient One-off missions are the challenge



INDIVIDUALITY

ALWAYS REMEMBER THAT YOU ARE UNIQUE. JUST LIKE EVERYBODY ELSE.

The path to mission success?





The path to mission success?

- The traditional project lifecycle is being challenged due to
 - Shorter project timescales (~6-12 months)
 - Much wider (mixed-experience) customer base
 - broader risk acceptance range
- In the last 9 years, ISIS has gained experience in working with tens of different one-off missions
- And has been involved in many different flight projects with different customers:
 - Universities and research institutes, commercial companies, consortia, etc.
- Each of these projects has their own challenges but they often share a number of common misconceptions, issues and result in programmatic challenges



Misconceptions – Paperwork is evil





Misconception – off the shelf Hardware



CubeSatShop.com | isispace.nl | isilaunch.com

The one-stop-shop for all your CubeSat and nanosat systems...

Home

CubeSat Structures

Communication Systems

Power Systems

Solar Panels

Attitude Control Systems

Antenna Systems

On Board Computers

Launch Adapters

Support Equipment

CubeSat Cameras

CubeSat Kits and Buses

Ground Stations

Training Simulator

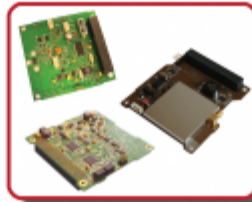
Propulsion & Pressurisation

Welcome to the CubeSatShop, the one stop webshop that offers a broad range of products for CubeSats and nanosatellites in general. The webshop offers standardized, off-the-shelf components and subsystems from a variety of manufacturers.

Categories



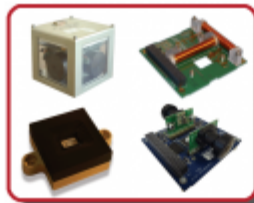
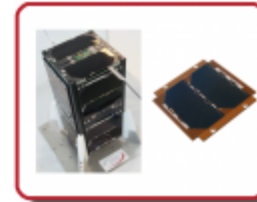
CubeSat Structures



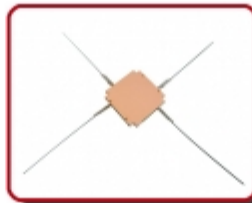
Communication Systems



Power Systems



Attitude Control Systems



Antenna Systems

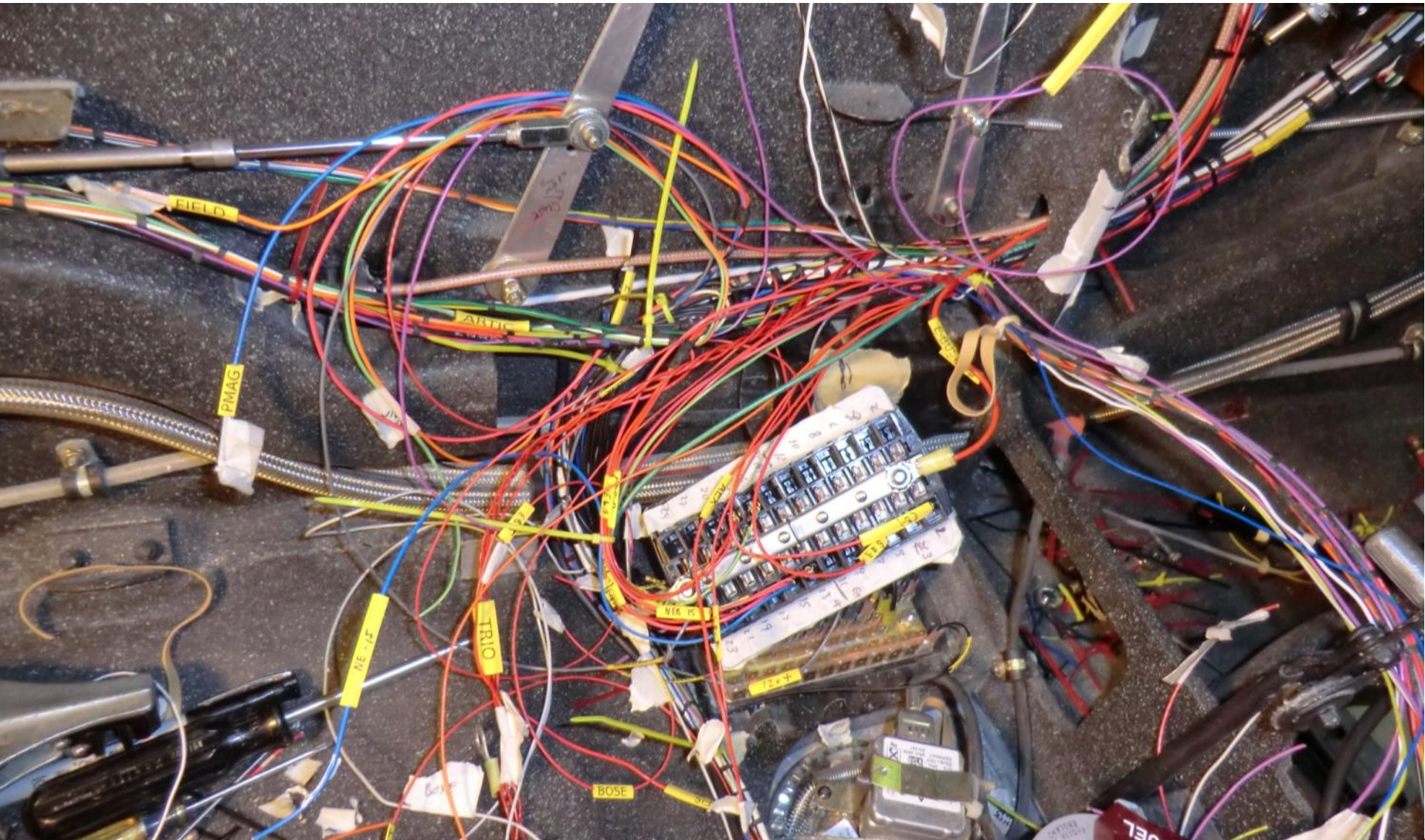


Command & Data Handling



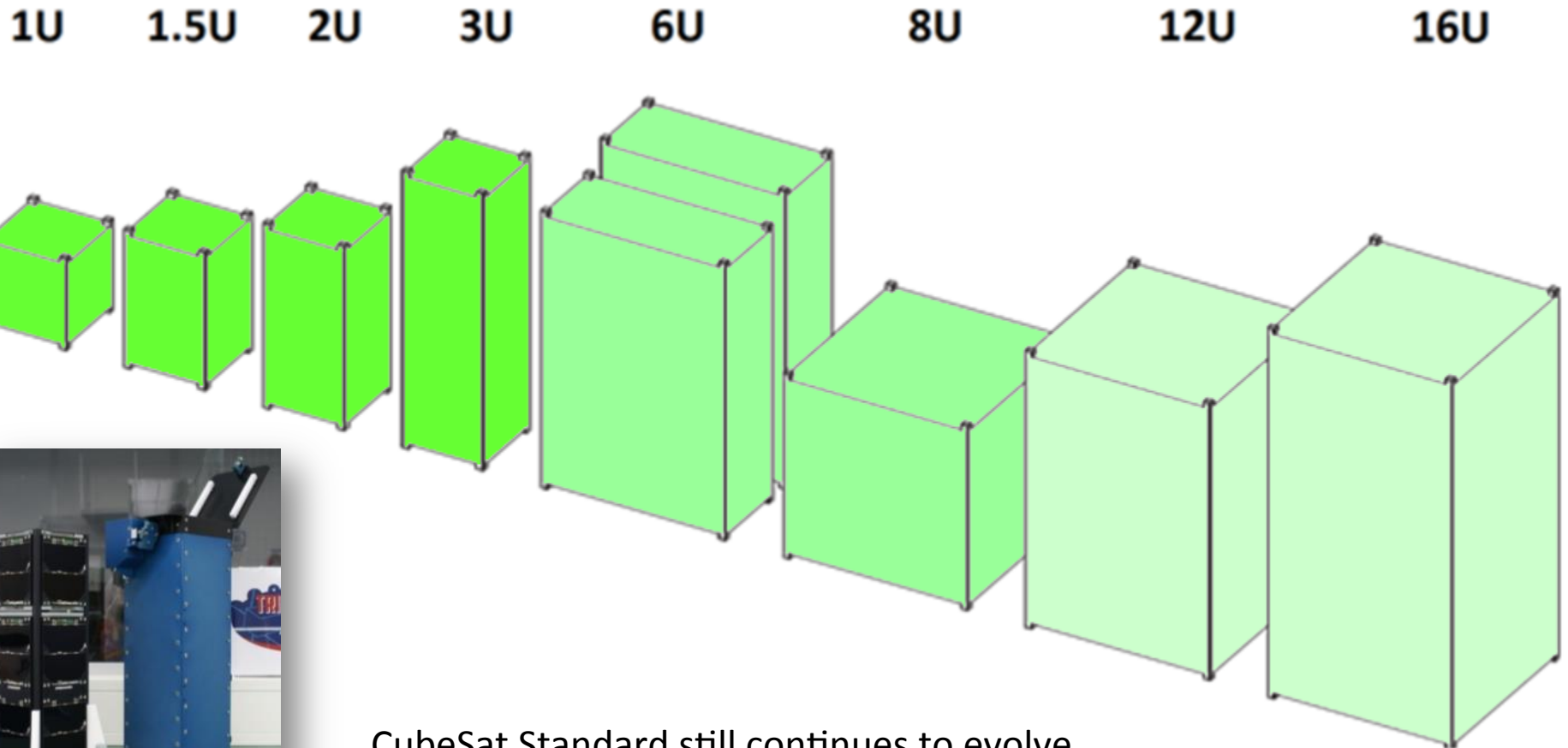


Misconception – Plug-and-Play



Misconception – Strict CDS adherence

CubeSats: 1 kg (10x10x10cm) to 25kg (22x22x45)



CubeSat Standard still continues to evolve

Causes for issues – The Customer

"The customer is always right," is half a sentence. The rest of it is, "if the customer is reasonable and not an idiot"

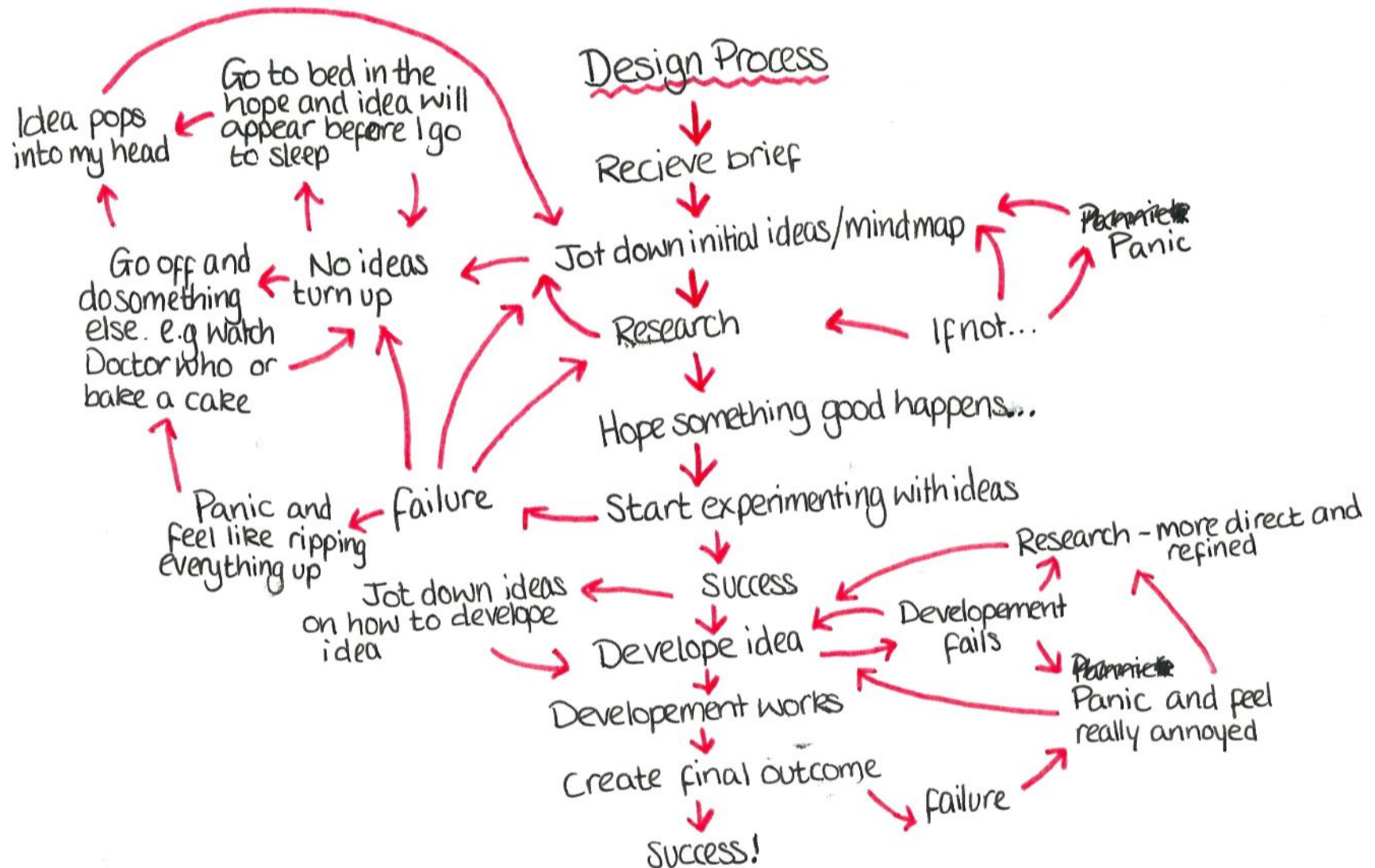




Causes for issues – The Customer

- Varying customer type
 - Experience Level In Space Missions
 - Subject Matter Expertise
 - Expectations
- Level of involvement varies
 - Mission Objectives and requirements
 - Requirements creep / scope creep
 - Unclear on interface responsibility
- Is also subject to various influences
 - Consortia, sponsors and funding bodies
 - Hidden requirements / constraints

Causes for issues – process uncertainty





Causes for issues – process uncertainty

- Funding cycle drives configuration
- Imposed external process
- Requirements creep / scope creep
- Skipping mission definition process
- Review by date , rather than design readiness
- Hidden requirements / constraints



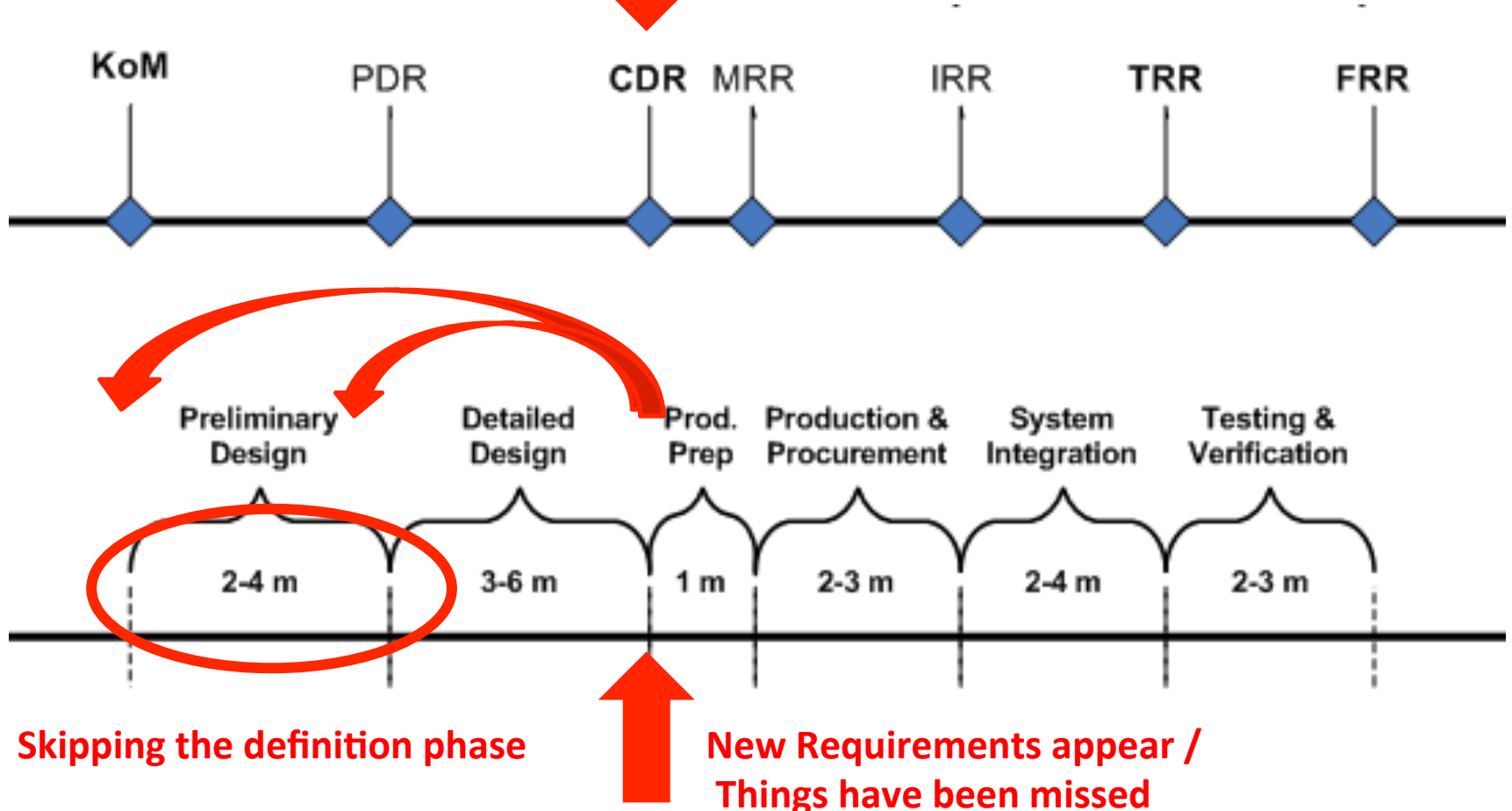
Common results

- Chaos
- Switching design approaches midway the project
- Redoing work
- Delays
- Cost escalation



Common CubeSat Design Process

Waiting on new budget or descoping of mission





Lessons Learned



- Focus on mission definition and preliminary design
- Don't take too many shortcuts
- Contractual split between design and implementation phase helps
- Plan for the worst case scenario
- Get all requirements and constraints on the table early
- Educate the customer, educate the supplier



Conclusions

- CubeSat projects do not always use traditional design process
- This causes different issues and different solutions for different projects
- By improving the way these different projects are run, we might actually end up with a process that is more optimal than the traditional process
- But it is important to deliberately choose a certain process and avoid costly pitfalls or changes in design process halfway a project.



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Thank you for your attention!

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